

Method for Fast Design of Multi-objective Frequency-shaping Equalizers

Abstract

A method for fast design of an equalizer to compensate for some undesired frequency response of an existing system. It can incorporate frequency response data directly. It allows for the performance tradeoff between a plurality of input-output channels. One embodiment of the invention comprises: defining a system block diagram including a equalizer, an existing system, and one or more weighting filters for the performance tradeoff between a plurality of input-output channels; defining a set of performance tradeoff equalities, each on one of a selected set of discrete frequencies; providing the frequency response data for the equalities; solving independently the magnitude of the equalizer frequency response of each of the discrete frequencies; generating the phases of the equalizer such that the magnitudes and the phases correspond to the frequency response of a stable system; implementing the equalizer with parameters derived from the magnitudes and the phases. Each of the performance tradeoff equalities is defined such that the frequency response of the

equalizer to be solved is first constrained to be real or nonnegative, at each of the selected frequencies. In another embodiment, the performance tradeoff equalities are substituted with a set of performance tradeoff optimization problems. Each of the performance tradeoff optimization problems is defined such that the frequency response of the equalizer to be optimized is first constrained to be real or nonnegative, at each of the selected frequencies.